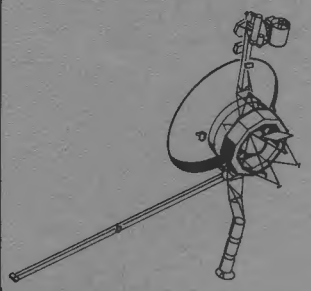

MISSION STATUS BULLETIN

VOYAGER

August 9, 1977 **No. 1**

MISSION PLAN

Less than one month from today, about August 20, man will begin another journey into outer space, searching the heavens for answers to age-old questions. The National Aeronautics and Space Administration's Voyager Project will send two advanced Mariner-class spacecraft to fly past the outer planets Jupiter and Saturn, and perhaps, Uranus, gathering scientific data on these giants and their satellites, as well as on interplanetary space itself.

If all goes according to schedule, two years to the day after the launch of the Viking Mission to Mars, the first of two Voyager spacecraft will be catapulted on a trajectory which will target it for arrival at Jupiter in April, 1979, with closest approach in July. About twelve days after the first launch, a second spacecraft will follow. Due to planetary alignments and other trajectory considerations, this second ship, designated Voyager 1, will overtake the first-launched and arrive at Jupiter four months in advance of it, beginning its observatory phase in December, 1978. Therefore, the first-launched craft will be designated Voyager 2, as it will become the later arrival at the target planets.

The Voyager spacecraft are unique in many respects. Their launch will mark the end of an era in space travel, being the last planned use of Titan III/Centaur launch vehicles. With the advent of the Space Shuttle in the 1980's, spacecraft will be launched from the Shuttle Orbiter.

Electrical power for the Voyager will be nuclear-fueled, using radioisotope thermoelectric generators (RTGs), rather than the solar panels used by the Mariners and Viking Orbiters. The Voyagers will travel perhaps 30 times as far from the sun as man has yet ventured, and at this distance, the solar energy available for capture and use will be greatly diminished, necessitating a more effective power source. RTGs have been used successfully by Pioneers 10 and 11.

The power usage of the 11 scientific instruments mounted aboard each spacecraft will be less than that of a 100-watt light bulb.

In the planned 8-1/2 years of the mission, Voyager will gather data on perhaps 15 heavenly bodies, the asteroids, and interplanetary space. While the primary targets are the planets Jupiter and Saturn, their satellites are as of great importance in providing clues to the universe, and thus the mission plan includes scrutiny of at least 11 of these satellites. An option exists to propel Voyager 2 on past Saturn to Uranus, seventh planet from the sun. Arriving in 1986, Voyager would provide the first close look at the rings of Uranus just discovered in the early part of 1977.

CURRENT STATUS

Failures in the Attitude and Articulation Control Subsystem (AACS) and Flight Data Subsystem (FDS) on the VGR77-2 spacecraft planned to be launched August 20 have resulted in a decision to interchange the two flight spacecraft.

First launch is still scheduled for August 20, the first day of the 30-day launch window. The VGR77-3 spacecraft will now take the first launch date. Switching of the two spacecraft can be accomplished with minimum risk to the targeted launch date since the VGR77-3 schedule has always been predicated on the capability to support the August 20 date.

All testing and checkout of the VGR77-3 spacecraft continues at the Eastern Test Range (ETR), Cape Canaveral, Florida, with the pre-countdown test scheduled for August 8. Encapsulation in the spacecraft shroud is scheduled for August 9, with mating to the TC-7 Titan/Centaur launch vehicle at launch pad 41 planned for August 11.

The failed AACS and FDS have been returned to the Jet Propulsion Laboratory in Pasadena, California. The spare AACS and a repaired FDS may be available for reinstallation in VGR77-2 at ETR by August 10, which could result in an encapsulation date of August 17.

Weight and center-of-gravity measurements conducted June 25 for VGR77-2 and July 16 for VGR77-3 included the gold-plated "Sounds of Earth" recording which will carry goodwill messages from man to the universe.

Mission Operations at Pasadena continues to generate sequences and perform test and training exercises. The operational readiness test was conducted August 2, and the Mission Operations Readiness Review was held August 5 and 6. Telemetry data flow verification tests are scheduled for August 8 and 12, with a full-up operational readiness test involving all elements in a launch configuration scheduled for August 15.

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National Aeronautics and
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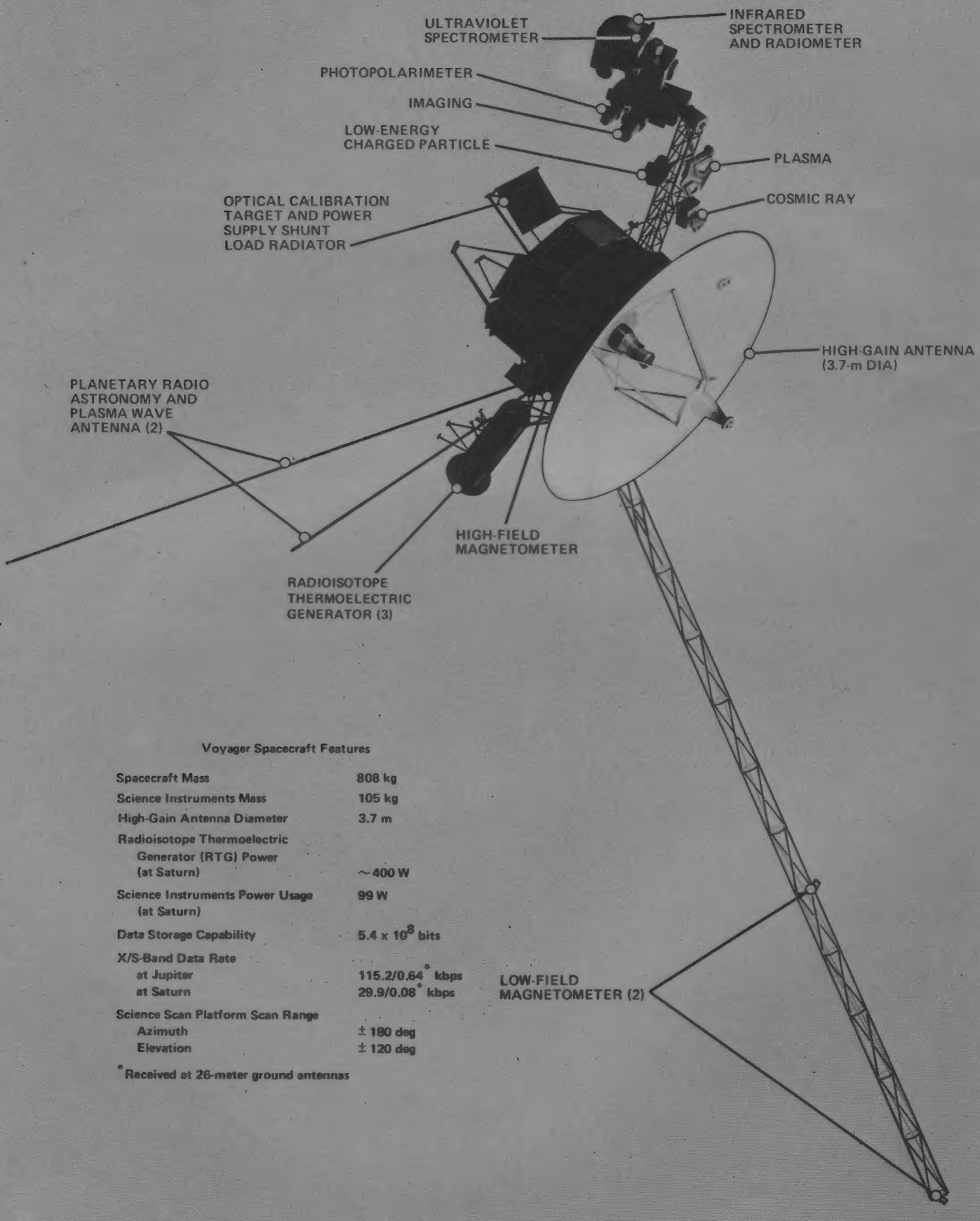
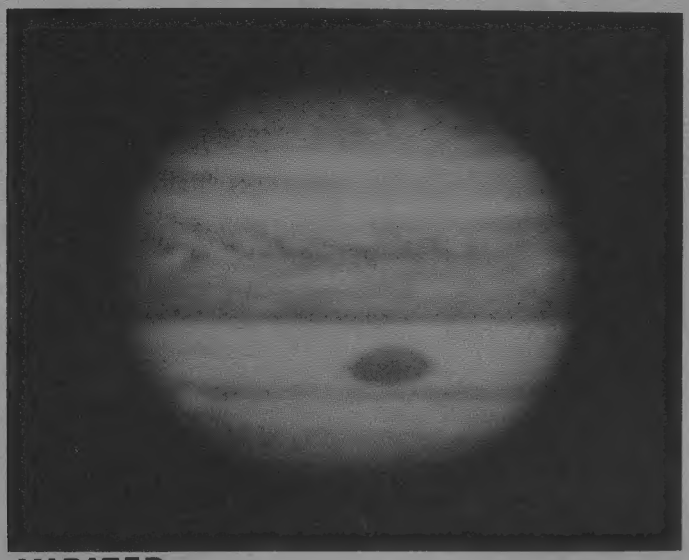


Voyager Spacecraft Features

Spacecraft Mass	808 kg
Science Instruments Mass	105 kg
High-Gain Antenna Diameter	3.7 m
Radioisotope Thermoelectric Generator (RTG) Power (at Saturn)	~400 W
Science Instruments Power Usage (at Saturn)	99 W
Data Storage Capability	5.4×10^8 bits
X/S-Band Data Rate	
at Jupiter	115.2/0.64* kbps
at Saturn	29.9/0.08* kbps
Science Scan Platform Scan Range	
Azimuth	± 180 deg
Elevation	± 120 deg

*Received at 26-meter ground antennas



JUPITER

Jupiter: fifth planet from our sun, largest in our solar system, named for the mighty god of Roman mythology. The giant planet, Jupiter, with its bright red and yellow bands and Great Red Spot, contains 98 percent of the matter in the solar system excluding the sun, radiates more than twice the amount of energy it receives from the sun, and may be composed of the same primordial constituents as formed the solar system nearly 4.6 billion years ago.

Five of its 13 or 14 known satellites are composed of Jovian elements; the outer satellites appear to have been formed outside the Jovian system and captured by its gravity as they passed the great giant. The density of the satellites decreases with increasing distance from the planet. One, Io, has been discovered to have both an atmosphere and an ionosphere.

Jupiter does not have a solid surface. All that is visible to man is its atmospheric pattern. Since the elements (hydrogen, helium, ammonia, methane and water) thus far detected on Jupiter by spectroscopy are colorless gases, much speculation exists as to the cause of the bands of color and the red spots.

The magnetic field of Jupiter is also intriguing. Voyager's scientific instruments will measure the limits of the magnetosphere and its interaction with its satellites and the solar wind, which is 25 times weaker at five times farther from the sun than is Earth.

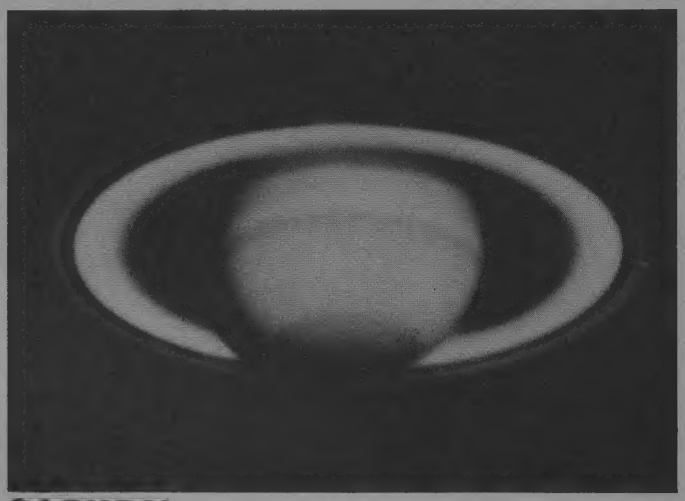
The four Galilean satellites, Io, Europa, Ganymede, and Callisto, discovered by Galileo in 1610, are large and bright enough to be seen by the unaided eye, if they were not occluded by the brilliance of Jupiter. Tiny Amalthea, innermost of the satellites, will also be surveyed.

Voyager's closest approach to Jupiter will occur in March 1979, at a distance of about 280,000 km. As it passes Jupiter on its trek to Saturn, it will also scan the Galilean satellites and Amalthea.

Voyager 2 will encounter the same five satellites before its closest approach to the planet itself in July 1979, from a distance of 645,000 km.

Voyager will significantly add to the exploratory data collected by Pioneers 10 and 11, providing a wealth of scientific information and laying further ground work for the next planetary exploration, Jupiter Orbiter/Probe, to be launched in 1981, which will deploy a small probe to tickle the atmosphere of Jupiter. Voyager's imaging system will provide the best pictures man has ever obtained of Jupiter, with such resolution that the Great Red Spot (40,000 km x 13,000 km) will fill 40 camera frames.

After a final look at the Jovian system, Voyager will turn toward its next goal, Saturn.



SATURN

Saturn, sixth planet from the sun, has yet to be visited by planetary spacecraft. Pioneer 11 will provide the first non-telescopic look at Saturn in September 1979 and 11 months later, in August 1980, Voyager 1 will enter the planet's territory. Voyagers 1 and 2 will survey Saturn, its rings, and six of its ten known satellites, Mimas, Enceladus, Tethys, Dione, Rhea, and the largest, Titan.

Telescopic observations show that Saturn is also banded, although not as definitively as Jupiter. Most distinctive feature of Saturn is, of course, its celebrated rings. First observed by Galileo in 1610, the rings remain an enigma. Various theories propose the composition of the four observed rings to be ice, rock, or metallic particles, ranging in size from four to 30 cm. It is certain that the rings are not solid and that they are not a thick band.

When the system is viewed edgewise from Earth, the rings are practically invisible, and have been determined to be about 10 km thick. The broadest ring is about 26,000 km wide, while the radius of the entire ring system is 140,000 km.

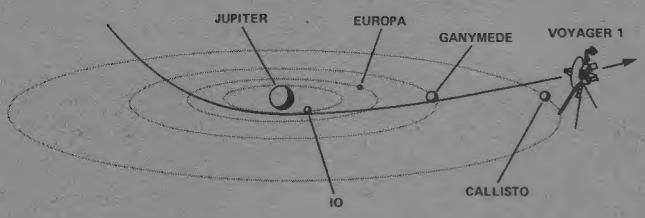
Voyager 1 will sail to within 4000 km of Titan's surface, and then will pass about 140,000 km below Saturn's south pole, about November 13, 1980. As it passes out of the Saturnian system it will fly through the ring plane, survey the north polar area of the planet, and encounter five more satellites.

Voyager 2 will enter Saturn's domain in June 1981, surveying the same six satellites and the rings, but from a more cautious distance. If all goes well, Voyager 2 may use the gravity of Saturn to boost itself towards Uranus, and its instruments must be in excellent operating condition for encounter with the seventh planet of the solar system.

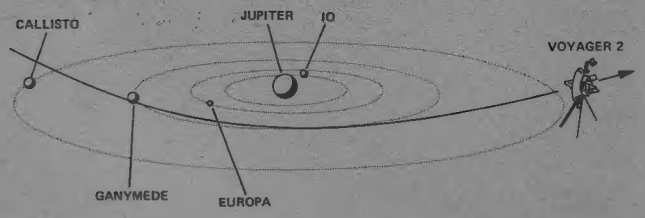
URANUS

Uranus was discovered in 1781 by Englishman William Herschel. Nearly two centuries later, in early 1977, James Elliott of Cornell University announced the startling discovery of Uranian rings. Voyager 2 may provide the first observation of the planet by a spacecraft, arriving in January 1986, over four years beyond Saturn.

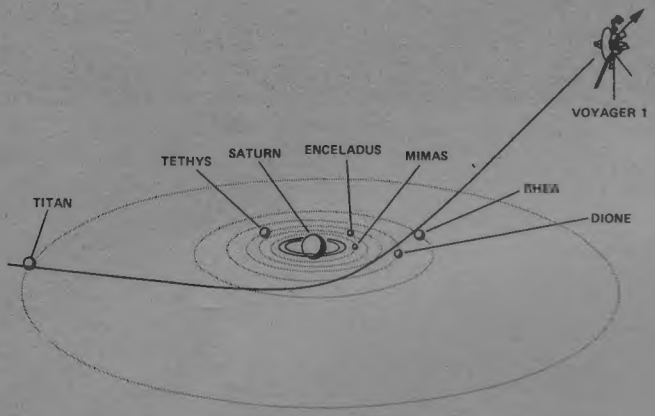
Thus, if all goes according to plan, in 8-1/2 years, the Voyager project will have surveyed more than 14 celestial bodies and interplanetary space with a depth and clarity never before achieved.



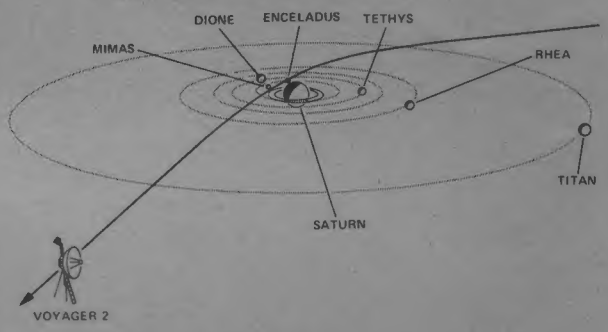
Voyager 1 will begin its Jupiter observatory phase about December 15, 1978, making its closest approach at about 280,000 km to the planet's visible surface about March 5, 1979. It will observe five Jovian satellites on its outbound leg.



Voyager 2 will begin its Jupiter observatory phase about April 20, 1979. The craft will observe the same five satellites on its inbound leg, before its closest approach to the planet at about 645,000 km.



Voyager 1's observations of Saturn will begin in August 1980, with closest approach at about 140,000 km in November 1980, Voyager 1 will pass through the ring plane as it observes six Saturnian satellites.



In June 1981, Voyager 2 will begin observations of Saturn and the same six satellites. Closest approach, at about 38,000 km from the outer edge of the rings, will be about August 27, 1981.

(Note: These computer simulations of the Voyager trajectories show each spacecraft's closest approach to each of the target bodies. Amalthea, Jupiter's nearest satellite, is not visible in these views.)

SCHEDULE

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
LAUNCH	AUGUST									
JUPITER ENCOUNTER –80 DAYS, V1		DECEMBER								
JUPITER ENCOUNTER, V1		MARCH								
JUPITER ENCOUNTER –80 DAYS, V2		APRIL								
JUPITER ENCOUNTER, V2		JULY								
SATURN ENCOUNTER –80 DAYS, V1			AUGUST							
SATURN ENCOUNTER, V1			NOVEMBER							
SATURN ENCOUNTER –80 DAYS, V2				JUNE						
SATURN ENCOUNTER, V2				AUGUST						
URANUS ENCOUNTER, V2									JANUARY	